

Technical Note No 14

Gas Killing of Chicks in Hatcheries

Introduction

Every year millions of chicks are dispatched in hatcheries because they are sickly, deformed or males unwanted for the production of eggs. Whilst the killing of day-old chicks is a sensitive issue, hatcheries are faced with the responsibility of making sure that every chick in their care is treated humanely. This includes chicks that are killed shortly after hatch.

In the UK, operators who are involved in the killing of chicks have a legal obligation to ensure they do not cause any 'avoidable pain, distress or suffering' under the Welfare of Animals at the Time of Killing Regulations 2015 (WATOK). Similar obligations are listed in the EU regulation on the protection of animals at the time of killing (Council Regulation (EC) No 1099/2009).

This leaflet focuses on the principles of gas killing, the relevant legislation and the advantages and disadvantages of the types of gas mixture used to kill chicks in the UK. It aims to provide constructive, practical advice to maximise bird welfare.

All staff involved in the killing of day-old chicks must fully understand the operation of the equipment they are using and how to deal with any problems that might arise.

Humane Slaughter Association
The Old School, Brewhouse Hill
Wheathampstead, Herts AL4 8AN, UK
Phone: +44 (0)1582 831919
Email: info@hsa.org.uk
Website: www.hsa.org.uk

Registered in England Charity No 1159690 Charitable Incorporated Organisation

Background

The development of the poultry industry has led to birds being genetically selected for different purposes, either egg or meat production. Laying hens are bred to produce as many eggs as possible, with a minimal amount of weight gain. Only females are used in the laying industry, and it is not economically viable to keep the males of laying strains for meat production. As a result, millions of day-old chicks are killed each year in hatcheries because they are males unwanted for the production of eggs or because they are sickly or deformed.

Three methods are legally permitted in the UK for killing chicks; these are:

- exposure to gas mixtures
- Instantaneous Mechanical Destruction (IMD)*
- dislocation of the neck (only recommended by the HSA for use in an emergency)

* see *Humane Slaughter Association (HSA) Technical Note No 9*

Principles of gas killing

The principle of gas killing is to deprive the brain of oxygen. This is achieved through inhalation of a gas mixture with very low oxygen content. Neonates, such as day-old chicks, are very resistant to oxygen deprivation. It is therefore necessary to expose the chicks to gas mixtures with very little residual oxygen for a considerable amount of time to ensure that the chick is killed, and not just unconscious (stunned).

The killing of chicks with gas mixtures does not result in an immediate loss of consciousness, therefore it is important to ensure that the induction of unconsciousness does not cause distress to the chicks. In addition to this, the type of gas used must be suitable for a commercial environment. The characteristics of an ideal, humane and efficient gas mixture include that it must:

- be capable of killing chicks
- be non-aversive
- induce loss of consciousness as rapidly as possible
- be reasonably cheap and safe to use in industrial conditions
- be relatively easy to contain within an open container

Gas mixtures

Gases most commonly used to replace the oxygen in a gas mixture are argon, nitrogen (N₂) and carbon dioxide (CO₂).

- **Carbon dioxide** is relatively cheap, heavier than air (therefore easy to contain) and is an anaesthetic gas which produces rapid unconsciousness when inhaled at high concentrations. However, carbon dioxide is an acidic gas and scientific research has shown that, at concentrations over 25%, it can cause head shaking and gasping in chicks, indicating that it is unpleasant to inhale.
- **Argon** is an inert gas (colourless, odourless, and tasteless), that is heavier than air. It kills chicks by anoxia (lack of oxygen) and is non-aversive. Argon is more expensive than both carbon dioxide and nitrogen.

- **Nitrogen** has the same properties as argon except it is slightly lighter than atmospheric air, so may be more difficult to contain in high concentrations.

The differences in time taken to loss of posture (an indication of approaching loss of consciousness) when exposed to carbon dioxide, argon or nitrogen do not vary much. However, the behaviour of chicks before the loss of consciousness indicates that anoxic gases (argon and nitrogen) do not cause any apparent respiratory discomfort and therefore should be the preferred gases to use.

UK Legislation

WATOK includes regulations on the killing of chicks by exposure to gas mixtures. Legal requirements include:

- chicks must be placed into the gas mixture and remain there until they are dead
- gas mixtures can be:
 - (i) 90% argon (or other inert gas) and a maximum of 2% total oxygen by volume (2% total oxygen by volume is the proportion of oxygen in a 90% argon, 10% air mixture, as the amount of oxygen in air is 21%)

This is the least aversive of the legal gas mixtures for the killing of day-old chicks, and HSA recommends the use of at least 95% argon mixed with <5% air, ensuring a residual oxygen level of <1%.

- i. a maximum of 40% carbon dioxide and a minimum of 60% argon (or other inert gas) with no more than 2% total oxygen by volume

HSA recommends a maximum of 25% carbon dioxide, at least 70% argon and <5% air, to ensure a residual oxygen level of <1%.

- ii. the highest possible concentration of carbon dioxide from a source of 100% carbon dioxide

The HSA does not consider 100% carbon dioxide an acceptable method for day-old chick disposal.

Welding gas, commonly used in hatcheries for the killing of chicks, consists of a mixture of argon and carbon dioxide in ratios ranging from 95:5 to 75:25 and, when mixed with 5% air, the gas mixture used will have a carbon dioxide content below 25%. The HSA does not consider the use of gas mixtures with more than 25% carbon dioxide to be an acceptable method for chick disposal. Hatcheries are therefore advised to use an alternative gas system (with $\leq 25\%$ or no carbon dioxide) or Instantaneous Mechanical Destruction (IMD; see HSA Technical note on this subject). Both are effective and humane methods of disposal, provided that equipment is set up and operated correctly.

With all these gas mixtures convulsions may occur, but these start only after the loss of consciousness and therefore do not have any welfare implications.

It must be noted that when anoxic gas mixtures (argon or nitrogen) are used for the killing of day-old chicks, the residual oxygen concentration is critical. This must be kept below 2% and exposure to the gas mixture must be for long enough to ensure that all chicks are killed effectively and as quickly and humanely as possible. **The HSA recommends that residual oxygen level should not exceed 1%.**

DISCLAIMER OF LIABILITY

In no circumstances can the HSA accept liability for the way in which the equipment in this leaflet is used, or for any loss, damage, death, or injury caused thereby, since this depends on circumstances outside the HSA's control.

© HSA 2023

Last updated : January 2023

Further Reading

Code of Practice for the Killing of Chicks in Hatcheries (4th Edition) - HSA 2023

Technical Note No 9 Instantaneous Mechanical Destruction (IMD) for the killing of chicks in hatcheries - HSA 2023

[Council Regulation \(EC\) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing. Official Journal of the European Union, 18.11.2009; L303/1-30.](#)

The Welfare of Animals at the Time of Killing (WATOK) – Defra Regulations:

- Link for regulation in England (2015):
<https://www.legislation.gov.uk/uksi/2015/1782/contents/made>
- Link for regulation in Wales (2014):
<https://www.legislation.gov.uk/wsi/2014/951/regulation/3/made>
- Link for regulation in Scotland (2012):
<https://www.legislation.gov.uk/ssi/2012/321/contents/made>
- Link for regulation in Northern Ireland (2014):
<https://www.legislation.gov.uk/nisr/2014/107/contents/made>